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EXAMINER	
MCDONALD, RODNEY GLENN	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 10/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/667,823	NOZAWA ET AL.	
	Examiner	Art Unit	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *28-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *28-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. "Attenuated phase-shifting masks of chromium aluminum oxide", Applied Optics, Vol. 32, No. 19, July 1, 1998 in view of Fujikawa et al. (Japan 01-173718) and Schmitz et al. (U.S. Pat. 5,447,570).

Regarding claim 28, Kim et al. teach an apparatus for depositing a phase-shifting mask layer for a photomask. (See Abstract) The apparatus is shown in Fig. 3 with the target directed downward in the direction of gravity and the substrate directed upwards

with respect to the direction of gravity. (See Fig. 3; page 4255) Table 1 shows the parameters used when depositing the film. (See Table 1; page 4256)

The difference not yet discussed is shielding the peripheral edge of the substrate to prevent film from being formed on the peripheral edge and where the shielding plate is movable so that the shielding plate is removed when the substrate is placed and the shield is replaced with a clearance between the surface of the substrate and the shielding plate for film deposition.

Regarding claim 28, Fujikawa et al. establish the teaching of providing a substrate 2 opposite a target for sputtering and shielding the peripheral part of the substrate 2 from the target and a light shielding film is formed by sputtering. (See Abstract) Schmitz et al. teach a movable shield in Fig. 14 which is useful for preventing the edge and backside coating on substrates in cases where contact between the seal ring and the front side of the wafer would result in unacceptable loss of otherwise coated and usable area around the periphery of the substrate, or contact between the seal ring and the substrate during coating might result in contiguous coating between the seal ring and the substrate that would fracture when the ring is withdrawn, causing particulate formation. (Column 16 lines 59-68; Column 17 lines 1-2)

The motivation for shielding the peripheral edge of the substrate is that it allows for preventing electrification of the plate when electron exposing. (See Fujikawa Abstract) The motivation for providing a gap between the periphery of the substrate and the shielding plate is that it allows for preventing fracture of the coating when the shield is withdrawn. (See Schmitz et al. Column 16 lines 59-68; Column 17 lines 1-2)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Kim et al. by utilizing a shield on the peripheral part of the substrate and where the shielding plate is movable so that the shielding plate is removed when the substrate is placed and the shield is replaced with a clearance between the surface of the substrate and the shielding plate for film deposition as taught by Fujikawa et al. and Schmitz et al. because it allows for preventing electrification of the plate when electron exposing and for preventing fracture of the coating when the shield is withdrawn.

Claims 29, 30 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. "Attenuated phase-shifting masks of chromium aluminum oxide", Applied Optics, Vol. 32, No. 19, July 1, 1998 in view of Tanaka (U.S. Pat. 5,824,197) and Ballentine et al. (U.S. Pat. 5,248,402).

Regarding claim 29, Kim et al. is discussed above and all is as applies above. (See Kim et al. discussed above) Kim et al. further teach utilizing DC magnetron sputtering for forming the film. The apparatus has at least a sputtering target, a magnetron cathode, a substrate holder. The surface of the target is directed downwards with respect to a gravity direction. (See Kim et al. page 4255)

The differences between Kim et al. and the present claims is that utilizing a whole-surface erosion cathode is not discussed (Claim 29), utilizing a shield that has a shape such that a position on the shield in the vicinity of the target and the target is of sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate (Claim 29), a shield for the non-sputtered

area on the target is not discussed (Claim 30) and the shield having a curved corner surface is not discussed (Claim 35).

Regarding the use of a whole-surface erosion cathode (Claim 29), Ballentine et al. teach utilization of a magnetron the ensures that erosion occurs over the entire surface of the target so that the target is kept clean during the sputtering process. (Column 1 lines 55-59) The substrate can be an optical element. (Column 3 lines 13-16)

The motivation for utilizing a magnetron that utilizes whole surface erosion is that it allows the target to be kept clean during sputtering. (Column 1 lines 55-59)

Regarding the utilization of a shield that has a shape such that a position on the shield in the vicinity of the target and the target is of sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate (Claim 29), Tanaka teach that the target shield should have a concave, curved surface away from a target so that the sputtered particles have improved vertical directionality. (See Abstract) The shape of the shield reduces the number of ions lost from the plasma. (Column 3 lines 30-33) The shape of the shield also effects the atoms or ions are controlled to be vertical direction with respect to the target. (Column 3 lines 65-67) Thus the shape of the shield decreases the deposition on the shield (and thus controls the film formation rate on the shield to be slower than on the substrate) and increases the deposition on the substrate surface (and thus controls the film formation rate on the shield to be larger than on the substrate).

The motivation for utilization of a shield that has a shape such that a position on the shield in the vicinity of the target and the target is of sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate is that it allows for improving sputter deposition uniformity at low pressures. (Column 2 lines 51-52)

Regarding the shield for the non-sputtered area of the target (Claim 30), Tanaka teach in Fig. 4 the shield extending in the non-sputtered area of the target. (See Fig. 4)

The motivation for providing a shield in the non-sputtered area of the target is that it allows for improving sputter deposition uniformity at low pressures. (Column 2 lines 51-52)

Regarding the shield having a curved corner surface (Claim 35), Tanaka teaches a concave curved corner surface away from the target. (See Tanaka Abstract)

The motivation for providing a shield having a curved corner surface is that it allows for improving sputter deposition uniformity at low pressures. (Column 2 lines 51-52)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Kim et al. by utilizing a whole-surface erosion cathode as taught by Ballentine et al. and to have utilized a shield that has a shape such that a position on the shield in the vicinity of the target and the target is of sufficiently long distance so as to prevent a relative film formation speed on the shield from being larger than that on the substrate, utilized a shield for the non-sputtered area on the target and utilized a shield having a curved corner surface as taught by Tanaka

because it allows for keeping the target clean during sputtering and improving sputter deposition at low pressures.

Claims 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ballentine et al. and Tanaka as applied to claims 29, 30 and 35 above, and further in view of Gogh et al. (U.S. Pat. 6,620,296).

The differences not yet discussed are where the target has a non-sputtered portion whose surface is roughened (Claim 31), where the non-sputtered portion is an end surface (Claim 32) and where the target has a curved corner surface (Claim 33).

Regarding the being roughened (Claim 31), Gogh et al. teach texturizing the redeposition area with Al arc spray material. (Column 7 lines 66-68; Column 8 lines 1-4)

Regarding the non-sputtered portion being an end surface (Claim 32), Gogh et al. teach that the non-sputtered portion (i.e. the end portions) can be texturizing. (Column 7 lines 66-68; Column 8 lines 1-4)

Regarding the target having a curved corner surface, Gogh et al. teach in Fig. 3C providing a target with a curved surface. (See Fig. 3C: Column 4 lines 60-68; Column 5 lines 1-16)

The motivation for utilizing a curved surface and a texturized end surface portion is that it allows for reducing particles during sputtering. (Column 1 lines 59-61)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a curved surface and a texturized end

surface portion as taught by Gogh et al. because it allows for reducing particles during sputtering.

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ballentine et al. and Tanaka as applied to claims 29, 30 and 35 above, and further in view of Katsura et al. (U.S. Pat. 4,933,063).

The difference not yet discussed is where the shield is kept at constant temperature. (Claim 34)

Regarding keeping the shield at constant temperature (Claim 34), Katsura et al. teach the use of heater for heating a protection plate to a specified temperature and to maintain the specified temperature after sputtering is complete. (See Abstract)

The motivation for providing a heater to a shield is that it allows for reducing the amount of dust particles. (Column 2 lines 24-26)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a shield kept at constant temperature as taught by Katsura et al. because it allows for reducing the amount of dust particles.

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ballentine et al. and Tanaka as applied to claims 29, 30 and 35 above, and further in view of Mintz et al. (U.S. Pat. 6,162,297).

The difference not yet discussed is the shield having a roughened surface. (claim 36)

Regarding the shield having a roughened surface (Claim 36), Mintz et al. teach knurling a shield to provide a roughness for reducing particle contamination. (Column 1 lines 60-68; Column 2 lines 9-20; Column 2 lines 24-34)

The motivation for roughening the surface of a shield is that it reduces particle contamination. (Column 2 line 25)

Therefore, it would have been obvious to one of ordinary skill art at the time the invention was made to have utilized a roughened shield as taught by Mintz et al. because it allows for improving sputter deposition uniformity at low pressures and reduces particle contamination.

Claims 30 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ballentine et al. and Tanaka as applied to claims 29, 30 and 35 above, and further in view of Mostovoy et al. (U.S. Pat. 6,428,663).

The differences not yet discussed are where a shield is provided for the non-sputtered area of the target (Claim 30) and where the target is attached to a backing plate having a roughened surface. (Claim 37)

Regarding where the a shield is provided for the non-sputtered area of the target (Claim 30) and where the target is attached to a backing plate having a roughened surface (Claim 37), Mostovoy et al. teach a target which has a front surface 103 and side surface 105. A coating 107 is applied to the side surface 105 of the target 101 (i.e. to shield the side surface) The coating 107 preferably has a surface roughness greater than 200 microinches. The coating may also be applied to a portion of the target's

backing plate 108 as shown in Fig. 2. (i.e. to shield that portion of the backing plate). (Column 3 lines 38-47)

The motivation for providing a mechanism for shielding the surface of the non sputtered area of the target and roughening the backing plate is that it allows for preventing crumbling of sputtered particles. (Column 3 line 55)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a mechanism for shielding the surface of the non-sputtered area of the target and roughening the backing plate as taught by Mostovoy et al. because it allows for preventing crumbling of sputtered particles.

Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Ballentine et al. and Tanaka as applied to claims 29, 30 and 35 above, and further in view of Fujikawa et al. (01-173718).

The difference not yet discussed is where a shield plate is provided for preventing the film from being formed on a peripheral portion of the substrate.

Fujikawa et al. establish the teaching of providing a substrate 2 opposite a target for sputtering and shielding the peripheral part of the substrate 2 from the target and a light shielding film is formed by sputtering. (See Abstract)

The motivation for shielding the peripheral edge of the substrate is that it allows for preventing electrification of the plate when electron exposing. (See Fujikawa Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a shield plate for preventing the film from

being formed on a peripheral portion of the substrate as taught by Fujiwara et al. because it allows for preventing electrification of the plate when electron exposing.

Response to Arguments

Applicant's arguments filed 9-29-05 have been fully considered but they are not persuasive.

In response to the argument that the prior art of record does not teach a shielding plate for shielding a peripheral edge of the substrate to prevent film deposition on the peripheral edge, wherein the shielding plate is movable so that the shielding plate is removed when the substrate is placed and the shield is replaced with a clearance between the surface of the substrate and the shielding plate for film deposition, it is argued that Fujiwara et al tech the need for shielding the peripheral edge of a photomask blank for deposition. Schmitz et al. recognize that a gap is need for a shield that shields the periphery and backside of the substrate in order to prevent damage to the film when removing the shield from the substrate. (See Fujiwara and Schmitz et al. discussed above)

In response to the argument that Tanaka does not suggest whole-surface erosion of the cathode, it is argued that Ballentine et al. teach whole surface erosion of the cathode for keeping the cathode surface clean. Therefore the prior art as a whole suggest Applicant's invention. (See Tanaka and Ballentine et al. discussed above)

In response to the argument that Tanaka does not teach a shield having a shape such that the position of the shield in the vicinity of the target and the target is of sufficiently long distance so as to prevent relative film formation speed on the shield

from being larger than that on the substrate, it is argued that Tanaka teach that the target shield should have a concave, curved surface away from a target so that the sputtered particles have improved vertical directionality. (See Abstract) The shape of the shield reduces the number of ions lost from the plasma. (Column 3 lines 30-33) The shape of the shield also effects the atoms or ions are controlled to be vertical direction with respect to the target. (Column 3 lines 65-67) Thus the shape of the shield decreases the deposition on the shield because of the vertical ion control (and thus controls the film formation rate on the shield to be slower than on the substrate) and increases the deposition on the substrate surface because of the vertical ion control (and thus controls the film formation rate on the shield to be larger than on the substrate). (See Tanaka discussed above)

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
October 18, 2005